



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**21.03.2001 Bulletin 2001/12**

(51) Int Cl.7: **H04L 25/03, H04L 25/49**

(43) Date of publication A2:  
**03.06.1998 Bulletin 1998/23**

(21) Application number: **97309276.0**

(22) Date of filing: **18.11.1997**

(84) Designated Contracting States:  
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC  
NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

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(30) Priority: **27.11.1996 US 757207**

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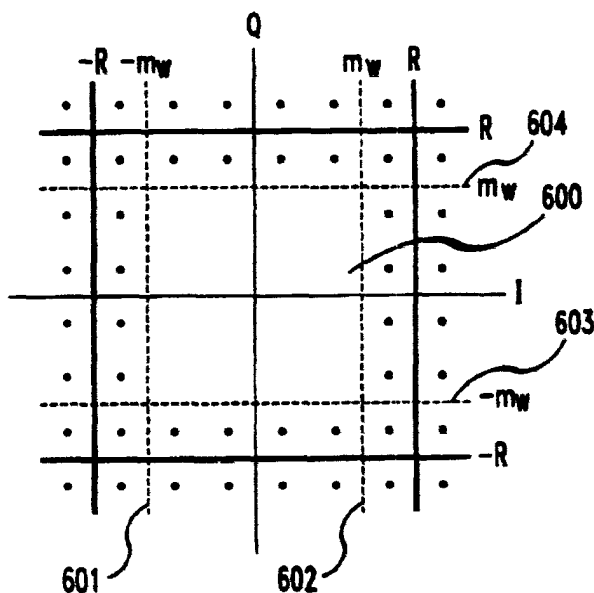
(71) Applicant: **LUCENT TECHNOLOGIES INC.**  
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(54) **A windowing technique for blind equalisation**

(57) A blind convergence technique is restricted to using a subset of equalizer output samples. Illustratively, a receiver implements a windowed MMA approach. In this windowed MMA approach, a sample window

overlays the two-dimensional plane representing the set of equalizer output samples. Only those equalizer output samples appearing within the sample window are used during filter adaptation.

**FIG. 21**





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# EUROPEAN SEARCH REPORT

Application Number  
EP 97 30 9276

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                       |                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Category                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Relevant to claim                                                                                                                                                                                                                                                                     | CLASSIFICATION OF THE APPLICATION (Int.Cl.6)        |
| X                                                                                                                                                                                                                                                      | JABLON N K: "JOINT BLIND EQUALIZATION, CARRIER RECOVERY, AND TIMING RECOVERY FOR HIGH-ORDER QAM SIGNAL CONSTELLATIONS"<br>IEEE TRANSACTIONS ON SIGNAL PROCESSING, US, IEEE, INC. NEW YORK, vol. 40, no. 6, 1 June 1992 (1992-06-01), pages 1383-1397, XP000305227<br>ISSN: 1053-587X<br>* abstract *<br>* page 1383, column 2, line 20 - line 27 *<br>* page 1384, column 1, line 20 - line 33 *<br>* page 1384, column 1, line 46 - column 2, line 32; figure 4 *<br>* page 1385, column 1, line 57 - column 2, line 55 *<br>* page 1388, column 1, line 20 - line 25 *<br>* paragraph [CONCLUSIONS] *<br>--- | 1-4,6-9,<br>11-15                                                                                                                                                                                                                                                                     | H04L25/03<br>H04L25/49                              |
| X                                                                                                                                                                                                                                                      | SETHARES W ET AL: "Approaches to blind equalization of signals with multiple modulus"<br>ICASSP-89: 1989 INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH AND SIGNAL PROCESSING (IEEE CAT. NO.89CH2673-2), GLASGOW, UK, 23-26 MAY 1989,<br>pages 972-975 vol.2, XP002154011<br>1989, New York, NY, USA, IEEE, USA<br>* abstract *<br>* page 972, column 1, line 22 - line 30 *<br>* page 972, column 1, line 43 - column 2, line 8 *<br>* page 973, column 2, line 14 - line 44 *<br>* page 974, column 1, line 1 - line 12 *<br>* page 974, column 2, line 50 - page 975, column 1, line 19 *<br>---<br>-/--     | 1,5,7,8,<br>10,12,15                                                                                                                                                                                                                                                                  | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.6)<br><br>H04L |
| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                       |                                                     |
| Place of search<br><b>BERLIN</b>                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Date of completion of the search<br><b>19 January 2001</b>                                                                                                                                                                                                                            | Examiner<br><b>Binger, B</b>                        |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding document |                                                     |

EPO FORM 1503 03 82 (P04C01)



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# EUROPEAN SEARCH REPORT

Application Number  
EP 97 30 9276

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                            |                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Relevant to claim                                          | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | AXFORD R A JR ET AL: "The transversal and lattice multiple modulus algorithms for blind equalization of QAM signals"<br>MILCOM 95. UNIVERSAL COMMUNICATIONS. CONFERENCE RECORD (CAT. NO.95CH35750), PROCEEDINGS OF MILCOM '95, SAN DIEGO, CA, USA, 5-8 NOV. 1995,<br>pages 586-591 vol.2, XP002154012<br>1995, New York, NY, USA, IEEE, USA<br>ISBN: 0-7803-2489-7<br>* abstract *<br>* paragraph [SETUP] *<br>* page 587, column 1, line 21 - line 30 *<br>* page 587, column 2, line 16 - line 23 *<br>* page 588, column 1, line 34 - line 53 *<br>* page 589, column 1, line 43 - column 2, line 7 * | 1,5,7,8,<br>10,12,15                                       |                                              |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CHEN S ET AL: "MULTI-STAGE BLIND CLUSTERING EQUALISER"<br>IEEE TRANSACTIONS ON COMMUNICATIONS,US,IEEE INC. NEW YORK, vol. 43, no. 2/04, PART 02, 1 February 1995 (1995-02-01), pages 701-705, XP000502573<br>ISSN: 0090-6778<br>* abstract *<br>* page 702, column 2, line 50 - page 703, column 2, line 4 *                                                                                                                                                                                                                                                                                             | 1,2,7-9,<br>12,15                                          | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.6)      |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                            |                                              |
| Place of search<br><b>BERLIN</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Date of completion of the search<br><b>19 January 2001</b> | Examiner<br><b>Binger, B</b>                 |
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EPO FORM 1503 03.82 (P04C01)